

**Appendix II - Personal, Fatigue, and Delay (PF&D) Allowances**

## APPENDIX II

### PERSONAL, FATIGUE AND DELAY (PF&D) ALLOWANCES

#### General

\* Personal, Fatigue, and Delay (PF&D) is the time allowed a worker to compensate for attending to personal needs, for fatigue, and for delay occurring due to conditions beyond his control. This time is additive to the normal time required to accomplish a job. The inclusion of this allowance is common practice in the development of a labor standard. Present practices for computing PF&D have resulted in varied interpretation of the factors being considered and the use of different techniques to establish them. Variances in application range from an allowance for each element within a standard to the adoption of a fixed or blanket allowance for all standards in an organization or activity. As a result of these different practices, standards for identical work are inconsistent and result in different measurement criteria for identical jobs or functions and incomparable data at the summary levels. In order to minimize these variances, it is necessary to establish a standardized method of computing the PF&D allowances. The guidelines for developing allowances portrayed in this appendix have been accepted and used extensively for some time throughout the Department of Defense, and are established as the standardized method. \*

Where appropriate, a fixed PF&D allowance based on the standardized method may be developed one time for a specific function or for groups of personnel doing similar work under similar conditions. The fixed allowance applies to all standards in the function or group and precludes the need to individually compute the allowance for each standard. In work situations where the guidelines are not applicable, the fixed allowance will be developed through work measurement techniques such as time study or work sampling.

#### Conditions for Consideration

The development and application of PF&D allowances requires that the various conditions under which a job is performed be examined and considered. To insure that all conditions are considered, separate factors are provided for each of the three areas; Personal, Fatigue, and Delay. Analysts/technicians must be completely objective in establishing the allowances which correctly reflect the true situations inherent to the job.

#### Allowances for Personal Time

Consider the surroundings, working conditions, and job requirements which cause the employee to stop work from time to time to attend to necessary personal needs, (go to restroom, get a drink of water, get fresh air, etc). Since most operations allow two breaks of 10 minutes each during the 480-minute shift, the basic allowance for

DoD 5010.15.1-M  
BASIC VOLUME

\* this factor will be 4.2 percent (20.0 minutes). If facilities layout \*  
\* or management policy dictate that longer break periods are required, \*  
\* it will be necessary to recompute the percentage for the Basic allow- \*  
\* ance subject to approval of higher authority. \*

Basic Allowance	Percent
	4.2

Add:

a. Normal office conditions	0	
b. Normal shop, central heat, slightly dirty or greasy	1	
* c. <u>Slightly</u> disagreeable conditions. Exposed to *		
* inclement weather part of time, poor heating, *		
* or poor cooling.	3	
d. Exposed to <u>extremely</u> disagreeable conditions *		
* most of time. Proximity to hot objects, con- *		
* tinuous exposure to disagreeable odors and *		
* fumes, or to excessive temperature ranges.	6	

Add the following where applicable:

\* a. Where time is allowed by management at the beginning \*  
\* of the shift to make ready and/or at the end of the \*  
\* shift to get/put away tools and equipment, clean up \*  
\* work area, or to don/remove special work clothing \*  
\* (aprons, smocks, etc.) allowances are as follows: \*

<u>TOTAL MINUTES ALLOWED FOR</u>		
<u>PREPARATION AND CLEANUP</u>	<u>% ALLOWANCE</u>	
5	1.0	
10	2.1	
15	3.1	
20	4.2	

\* NOTE: In "super-clean" room conditions, use (b) below to \*  
\* supplement these allowances. \*

\* b. Adjunctive allowance - allowed for work performed 4.0 \*  
\* in "super" clean rooms. Required when operators \*  
\* must utilize special clothing, which includes \*  
\* caps, boots, etc., and remove it when leaving \*  
\* work area. This includes time to invest or di- \*  
\* vest special clothing at beginning and ending of \*  
\* shift, at lunch, and for personal requirements. \*

\* c. Where the work period is 8 consecutive hours and 4.2 \*  
\* 20 minutes lunch period is allowed at the expense \*  
\* of the Government. \*

### Allowances for Fatigue

Physical: Consider the average weight handled per man and only those elements of time that the man is under load to determine percentage (total time for under load elements divided by base time and use the closest percentage on the chart). Also, consider the height that load must be manually lifted (average situation).

a. Weight Allowances. The percent allowances given below are based on the effective net weight being handled in the area between knees and chest. Chart also applies to laying weight on floor or low skid, or to sliding or rolling objects along a plane.

Effective Net Weight Handled	Percent of time under load				
	1-12	13-25	26-50	51-75	76-100
1-10	0	1	2	3	4
11-20	1	3	5	7	10
21-30	2	4	9	13	17
31-40	3	6	13	19	25
41-50	5	9	17	25	34
51-60	6	11	22	x	x
61-70	7	14	28	x	x
71-80	8	17	34	x	x

x - Study individual job for improvement considering job enlargement, mechanical aids, worker rotation or other stress relieving aids.

Table values will be multiplied by the following factors as dictated by conditions:

For picking up load from floor, multiply basic allowance by	1.10
For placing load above chest-height, multiply basic allowance by	1.20
For getting load from above chest-height, multiply basic allowance by	0.50

The application of the factors from this table in the computation formula on page A-II-10 will normally provide a realistic PF&D allowance. However, in some instances the use of these factors results in an unrealistic, zero or negative denominator in the formula. When this occurs, assuming all factors are defined correctly, it will be necessary to combine related elements or standards into higher levels until a realistic allowance is obtained. "Realistic" is defined as an allowance acceptable to the worker, the supervisor, and the analyst.

b. To determine the effective net weight for sliding or rolling objects the weight must be multiplied by following coefficients of friction:

*	<u>Coefficients of Friction (Average Values)</u>		*
*	<u>Surface</u>	<u>Friction Coefficient</u>	*
*	Wood on Wood	0.4	*
*	Wood on Metal	0.4	*
*	Metal on Metal	0.3	*
*	Example: Worker sliding a 40 lb. casting from metal conveyor		*
*	to wood work bench. $ENW = 40 \text{ lbs.} \times .4 = 16 \text{ lbs.}$		*

Position: Consider the position which the employees must assume to perform the operation. Select the class which best describes the average condition. It is assumed that the job will be less tiresome if the position can be varied frequently.

Class	Percent
a. Sitting or standing	0
b. Sitting	1
c. Walking	1
d. Standing	2
e. Climbing or descending ramps, stairs or ladder	4
f. Working in close, cramped position	7

Mental: Consider the degree of concentration necessary to perform the job and the amount of variety in the tasks. Highly repetitive jobs should be low in this factor.

Class	Percent	
a. Work largely committed to habit; simple calculations on paper, reading easily understood material such as routine or familiar instructions, counting and recording, simple inspection requiring attention but little discretion, arranging papers by letter or number.	0	*
b. Work requires full attention; copying numbers, addresses or instructions, memory of part number, name while checking stock or parts list, simple division of attention between work at hand and jobs of others, conveyor or time schedule, simple calculations in head, filing papers by subject of familiar nature.	2	
c. Work requires concentrated attention; reading of nonroutine instructions, routine calculations on paper such as long division and four-place multiplication, checking numbers, parts, papers, etc.,		

requiring cross check or double check, division of attention between three components such as accounting, inspecting, and grading or driving over unfamiliar route, watching vehicle, traffic and route signs.

4

- \* d. Work requires deep concentration; swift mental cal- \*
- \* culations or calculations on paper, memorizing, \*
- \* inspection work requiring interpretation and dis- \*
- \* cretion of unfamiliar nature, as when working \*
- \* against nonroutine specifications, highly divided \*
- \* attention between phases of work, operations of \*
- \* others, hazards, etc.

8

- \* Lighting: Consider the amount of light on the working surface \*
- \* in relation to the fineness of details upon which the operator works. \*
- \* Consider the amount of glare on the work surface and rapid changing \*
- \* or "hypnotic" effect on the work surface. \*

Class	Percent
Continual glare on work areas - Work requiring constant change in light on work area. Less than 75 foot candle power on work surface for normal job. Less than 125 foot candle power on work surface for close work.	2

- \* Noise Factor: Consider the general noise of the work areas as \*
- \* well as any annoying, sharp, staccato, or intermittent noises \*
- \* occurring during more than 50% of the work day. If ear plugs or \*
- \* ear muffs are worn, their sound deadening effect must be considered \*
- \* when using this allowance.

Class	Percent
a. Constant, rather loud noises such as in machine shops, motor test shops, etc. (over 60 decibels)	1
b. Average constant noise level but with loud, sharp, intermittent, or staccato noise such as nearby riveters, punch presses, etc. (Example: sheet metal shop).	2

Monotony: Consider the fatigue resulting from fast, highly repetitive operations. The cycle is the time elapsed from starting one element until the same element is started again.

DoD 5010.15.1-M  
BASIC VOLUME

Cycle Time	Percent
a. 0.00-0.20 minutes	4
b. 0.21-0.40 minutes	3
c. 0.41-0.80 minutes	2
d. 0.81-2.50 minutes	1
e. 2.51 minutes or more	0

**Restrictive Safety Devices and Clothing:** Consider those devices which are required by the job and which cause fatigue when worn. No allowance should be made here unless it is necessary to remove the device occasionally for relief, or if wearing them causes fatigue. If more than one device is required, add the allowances.

Class	Percent
a. Face shield	2
b. Rubber boots	2
c. Goggles or welding mask	3
d. Tight, heavy protective clothing	4
e. Filter mask	5
f. Safety glasses	0

**Allowances for Delay**

Consider the job in relation to adjacent jobs--how long can any adjacent job be shut down before the job being studied is affected? Also, consider other delays inherent in the job, such as supervisory interruptions, moving from one work station to another, waiting for cranes, etc. No delays which can be prevented by the employee should be considered here.

**Basic Allowance**

Class	Percent
a. Isolated job. Little coordination with adjacent jobs	1
b. Fairly close coordination with adjacent jobs	2

**Balancing Delay.** Where employees are required to move from one work station to another to balance adjacent stations, add the following:

a. Move once each 5 minutes	5
b. Move once each 30 minutes	3
c. Move once each 60 minutes	2
d. Move once each 2 hours	0

Special Delay Allowances

- \* Except for the above, there will be no predetermined or generally  
\* used delay allowance percent that is applied without an engineered  
\* backup study. It is recommended that an appropriate study be con-  
\* ducted in each shop or functional area to ascertain the additional  
\* delay allowance requirements.
- \* All noncyclic work elements will be apportioned in the manner that  
\* will most accurately add their cost to the product cost. Work  
\* elements such as cleaning chips and tool care and replacement,  
\* though occurring on an irregular basis, can be measured and the time  
\* required prorated directly to the machine operating portion of the  
\* work cycle rather than as an allowance. Certain other irregular  
\* occurring elements having a direct relationship to the job such as  
\* obtaining parts and materials and periodic inspection should be  
\* added to the cycle time on a prorated basis or as separate work  
\* element rather than added as an allowance. Again, care should be  
\* taken to assure that there is no duplication between cycle time  
\* elements and allowance elements. Nor shall the delay allowance  
\* be used as a "dumping ground" for operation activity not an inte-  
\* gral part of the work load in the shop.
- \* Special delay allowance elements fall into two categories; (1) those  
\* which occur on a non-foreseeable basis (power failure, minor repairs  
\* to defective parts, wait for job assignment), (2) those which occur  
\* on a time basis (daily, weekly, hourly). The following are examples  
\* of the type of special delay which can be considered for allowance:
- \* 1. Obtain job information from supervisor, inspector or pro-  
\* duction control.
  - \* 2. Wait for special tools already being used if waiting time  
\* cannot be eliminated.
  - \* 3. Power failure of non-reportable duration.
  - \* 4. Work interference.
  - \* 5. Minor rework elements if not caused by operator error.
  - \* 6. Extra work required due to hidden parts or material defects  
\* if minor.
  - \* 7. Unsuccessful hunt for parts or materials.
  - \* 8. Machine breakdown of non-reportable duration.



### Application of Allowance

#### Expression as Percentage

The factors provided in this procedure are expressed as a percentage of 480 minutes (eight hours). Since the productive time in the work day is a variable inversely proportional to the amount of PF&D allowance, it is necessary that all factors are expressed as a percentage of the total work day in order to provide a constant base. It is, therefore, necessary that all locally determined factors are similarly expressed.

#### Computation Procedures

##### Percent of Work Day

The application of the allowances requires that the total percent of PF&D allowance be determined first by adding the percentage for the applicable factors of the productive day before it can be applied. This is accomplished by dividing the total work day by the productive day expressed as a percent of the work day, i.e.,

$$\text{Allowance Factor} = \frac{100\%}{100\% - \text{allowance (\% of the work day)}}$$

##### a. Example:

Assume all factors total 15 percent allowance (this is 72 minutes of the 480 minute work day). Converting this allowance to a percentage of the productive day (408 min.) results in an allowance of 17.6 percent.

$$\text{Allowance Factor} = \frac{100\%}{100\% - 15\%} = \frac{100\%}{85\%} = 1.176$$

\* If allowances are expressed in minutes: \*

$$\text{Allowance Factor} = \frac{480 \text{ min.}}{480 - 72 \text{ min.}} = \frac{480 \text{ min.}}{408 \text{ min.}} = 1.176$$

\* \*

##### Application to Normal Time

The final step in the application of the allowance is to multiply the normal time by the allowance factor. For example, assume the rated productive time to be 408 minutes, the job standard would be:

$$408 \text{ minutes} \times 1.176 = 480 \text{ minutes}$$

# Examples of Application

## Unloading Boxes from Truck

- \* a. Job Conditions - Crew is unloading boxes from a truck and placing them on a pallet and the following conditions are in effect. \*
- \* (1) The operation is performed at a warehouse ramp. \*
- \* (2) The boxes weigh 25 pounds each and the employee is under load 25% of the time. The boxes are being taken from stacks slightly higher than his waist and are placed on pallets resting on the truckbed. \*
- \* (3) The work is purely routine.
- \* (4) The employee walks approximately five feet with each box.
- \* (5) The cycle time (per box) is .500 minutes, actual under load elements equal .125 minutes (if per pallet the % may be somewhat less).
- \* (6) No restrictive safety devices are required.
- \* (7) A forklift operator is considered a part of the unloading crew. \*

b. Computation of Allowance		Percent	
(1) Personal			
Base		4.2	
Class B Slightly disagreeable, exposed to weather		3.0	*
(2) Fatigue			
Physical - 25 pounds handled 25% of the time (total under load element time, .125 divided by cycle time, .500 = 25%).		4.0	*
Mental - Class A - work committed to habit		0.0	
Position - Class C (walking)		1.0	
Monotony - Class C (0.50 minutes)		2.0	
(3) Delays			
Class A. Little coordination with adjacent jobs		1.0	
(4) TOTAL ALLOWANCE		15.2	*

c. Allowance Factor

$$AF = \frac{100\%}{100\% - 15.2} = \frac{100\%}{84.8\%} = 1.179$$

d. Computation of Standard

\* If this operation is studied and the normal time is determined to be 0.500 minutes, the standard time would be computed as follows: \*

\*  $0.500 \times 1.179 = 0.590$  standard minutes. The number of decimal places used would depend on the time increments used in the manhour accounting system and the volume of production. \*

Aircraft Instrument Assembly

a. Job Conditions

An employee receives tray of parts and assembles small aircraft instrument. Completed instrument is delivered to outgoing window in clean room. Cycle time is 15 minutes.

- (1) Work is performed in "super" clean room.
- (2) No formal break periods have been established, but employees are free to attend to personal needs as necessary.
- (3) Instrument weighs less than one pound.
- (4) No clean up period at end of shift.
- (5) Employee performs work seated at work bench.
- (6) No restrictive devices are required.
- (7) Only occasional visual and mental concentration required.
- (8) Unavoidable delays have been established at 5% by separate study.

b. Computation of Allowances

Percent

(1) Personal	
Basic	4.2
"Super" clean room	4.0
(2) Fatigue	
Position-sitting	1.0
(3) Unavoidable Delay	5.0
(4) TOTAL ALLOWANCE	14.2

c. Allowance Factor

$$AF = \frac{100\%}{100\% - 14.2\%} = \frac{100\%}{85.8\%} = 1.166$$

d. Computation of Standard

Standard time is computed in the same manner as shown in the preceding examples.

Contract Administration

a. Job Condition - An employee is performing in a technical capacity administering contracts. The following conditions are in effect:

- (1) The operation is performed in a normal office.
- (2) The employee reviews and prepares contractual documents, contacts contractor or other government personnel for obtaining information or resolving problems, participates in meetings.

- (3) The work requires a combination of deep concentration and concentrated attention.
- (4) The employee is primarily sitting but does change positions throughout the work day (i.e., not restricted to desk).
- (5) Operations vary in cycle time and context.
- (6) No restrictive devices are required.
- (7) Delays are inherent in the job. Employee has the ability to shift to other operations when delays occur.

b. Computation of Allowance	Percent
(1) Personal Basic	4.2
(2) Fatigue	
Mental - work requires deep concentration 50% time and concentrated attention 50% time	6.0
Position - Sitting	1.0
Monotony	0.0
(3) Delay	
Isolated job	1.0
(4) TOTAL ALLOWANCE	12.2%

c. Allowance Factor

$$AF = \frac{100\%}{100\% - 12.2\%} = 1.139$$

d. Computation of Standard

Standard time is computed to the same manner as shown in the preceding examples.

Preparation of Voucher

a. Job Conditions

An employee is preparing a voucher for payment. The following conditions are in effect:

- (1) The operation is performed in a normal office.
- (2) The work requires full attention. Employee must check request for payment against contract clauses, make calculation on calculator and prepare voucher.
- (3) Employee accomplishes job at desk but may change routines to obtain additional data.
- (4) Cycle time of operation is 20 minutes.
- (5) No restrictive devices are required.
- (6) If flow of work is cut back, operation would have to be shut down or curtailed.

DoD 5010.15.1-M  
BASIC VOLUME

b. Computation of Allowance		Percent
(1) Personal		
Basic		4.2
(2) Fatigue		
Mental - Work requires concentrated		
attention		4.0
Position - Sitting		1.0
Monotony		0.0
(3) Delay		
Fairly close coordination with adjoin-		
ing jobs		<u>2.0</u>
(4) TOTAL ALLOWANCE		<u>11.2%</u>

c. Allowance Factor

$$AF = \frac{100\%}{100\% - 11.2\%} = 1.126$$

d. Computation of Standard

Standard time is computed in the same manner as shown in the preceding examples.